

ECONOMICS, ECONOMETRICS AND FINANCE

1. Introduction

Coronavirus, which appeared in the industrial megalopolis of Wuhan in China since the end of December 2019, is responsible for acute, sometimes fatal, respiratory disorders. The current coronavirus epidemic is above all a tragedy for individuals and communities. The toll for the Chinese people is already dire and is likely to worsen. On yet another level, some companies are suffering the full brunt of this crisis and are struggling to preserve activities on which millions of consumers and employees depend, directly impacted by their operation, or the disruption of it. To date, 80,000 infections have been reported, including thousands of fatal cases. In response to the spread of this unknown virus, World Health Organization (WHO) declared an international health emergency on January 30 [1].

The crisis erupted at a time, when the global economic horizon was clearing up: truce in the trade war between China and the United States, forecast of more optimistic growth of the International Monetary Fund (IMF) in 2020 (+ 3.3 %), renewed industrial confidence, out of the manufacturing recession phase with the absorption of stocks. Such a situation will inevitably have economic consequences, even if they are still difficult to assess; a short-term impact of 1 to 2 % for the Chinese economy. Faced with the coronavirus, the authorities imposed drastic containment measures. Most companies and factories, after having suspended their activity since January 23 for the Lunar New Year holidays, will remain closed, at the risk of paralyzing production chains across the country. Based on [1], more than two months have passed and WHO is now talking about a pandemic. South Korea, Japan, Iran, Italy, Europe. The situation does not seem to be completely under control. Nothing can and will not prevent the spread of the virus and the only solution to fight it effectively is containment.

China accounts for 20 % of world GDP, but 40 % of world growth. It is not unimaginable to have zero growth in Chinese GDP in the first quarter of 2020 and an annual GDP closer to 4 % than 6 %. The virus has spread throughout the world, and has mainly affected several economies in all regions of the world, such as Iran in the Middle East, and Europe, mainly Northern Italy: Lombardy, Veneto, Emilia Romagna, which are considered the economic and industrial lung of Italy. Currently around the world, Containment is seen as the only tool that seems to be effective in stopping the epidemic. One major drawback is that it keeps the workforce at home. This spread of the virus is the result of an intensified exchange between import and export flows between China on the one hand, and

CORONAVIRUS PROPAGATION AND ITS IMPACT ON THE WORLD ECONOMY

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Abstract: From the appearance of an unknown virus in China to a "black Monday" which has seen markets fall like never since the end of 2008: in two months, the Covid-19 epidemic has brought the world economy to its knees. The current coronavirus epidemic that has started in China is a real tragedy for individuals and communities not only in China, but around the world. The results for the Chinese are already terrible and are likely to worsen. To date, more than 80,000 infections have been reported, including thousands of fatal cases. In response to the spread of the virus, the world health organization declared an international health emergency on January 30. All global production chains are affected, and even blocked for certain sectors. A quasi-monopoly, China is not only the factory of the world, but also the supplier of components for all the other factories or industries on the planet. Hundreds of companies have therefore suffered the full force of this crisis and are struggling to preserve activities, on which millions of consumers and employees depend, directly impacted by their operation or by their disruption. The epidemic is infecting several Asian countries and little by little other continents, with more than 115,000 cases of infection to date, including more than 4,000 dead.

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all the countries of the world on the other. So, China is not only the factory of the world, but also the supplier of components of all the other factories or industries of the planet.

All the global production chains are affected or even blocked for some. Another almost monopoly of China is the rare earths, essential for batteries, but also to manufacture the blades and other components of wind turbines. China is the main supplier of several components, which concern various sectors, such as molecules with therapeutic effects. This country provides more than 80 % of the active ingredients, used by the global pharmaceutical industry. Added to this is that China is the main supplier to the electronics sector, for the whole world, in fact China produces the memories, necessary for telephones, computers, fiber optics and the 5G switches, necessary for telecom networks [1]. Not to mention the automotive sector, and its need for spare parts: cables, spare parts for automobiles, but also textiles for clothing.

Following the breakdown of the production chain, other key sectors were hit hard, and this affected all countries without exceptions, as it is air transport, which is in free fall, tourism is also at shutdown, oil prices are at

their lowest. The price index, which measures bulk shipping, has dropped 80 % since September to its second historic low, below the level of the 2008 crisis. A clash between supply and demand is taking shape, since factories are no longer functioning, and the state of containment paralyzed demand. Consequently, supply disruptions are likely to appear in the coming days. With all these shortages it could well appear the famous inflation which will cost dear to the central banks, which had not anticipated in their scenario a dark risk of this epidemic, the Covid-19. Thus, three types of risk will appear without any doubt: financial risk, which will impact the markets, a recession and geopolitical risk.

According to [2], the 2019 coronavirus began in the city of Wuhan (Hubei province) and belongs to the similar group of viruses as SARS and MERS. In most situations these viruses lead to comparatively mild symptoms, such as fever, coughing and shortness of breath (according to the World Health Organization). Because SARS has plagued China before (in late 2002 and 2003), it appears natural to assess the condition then to now. Before we do that, however, we should emphasize that there could be important differences between SARS and the 2019 coronavirus (Fig. 1), as we are still in the early stage of recognition. First, based on the current data, the 2019 coronavirus seems to be less deadly than SARS. Where SARS had a mortality rate (number of deaths per number of affected people) of 10 %, the 2019 coronavirus' most recent numbers indicate a significantly lower mortality rate.

	<i>SARS</i>	<i>MERS-CoV</i>	<i>2019-nCoV</i>
Origin	Southern China (Guangdong)	Saudi-Arabia, Middle-East	China (Wuhan)
Fatality rate	9.6 % – 11.0 % (mostly in China, HK, TW, CA and SG)	~35 %	2–5 % (mostly China so far)
Total cases	8098–8422	2494	7783 (29/1/2020)
Total fatalities	774–926	858	170
Period of outbreak	16 Nov 2002 – Jul 2003	2012Q4 –	8 Dec 2019 –
–Peak of outbreak	Feb 2003 – May 2003	Mar 2014 – End 2015	20 Jan 2020 –
Reproduction rate/infectiousness	2–4 (later reduced to 0.4)	"Does not pass easily human-human"	1.4–3.8
Incubation time	2–7 days (CDC)	2–14 days (~5 avg. CDC)	2–14 days

Fig. 1. A brief comparison of three coronaviruses
Source: WHO, Wikipedia, CDC, Johns Hopkins University CSSE

The aim of this paper is to present the impact of Coronavirus on the global economy. We use a data, collected from the World Health Organization. We employ principally the data relative to the Covid-19 and its influence on the world economy.

From our analysis, we find that the propagation of Coronavirus has affected all international economies. The situation has changed dramatically since 2003. In the aftermath of the SARS epidemic, China accounted for barely 4 % of world GDP and ranked sixth in economic terms. Today, it generates more than 16 % of global GDP, making it the second largest economic power in the world, just behind the United States. China has also been the main source of global growth for decades, with a contribution of more than 39 % in 2019 alone. At this point, the OECD estimates that the Chinese GDP growth will fall below 5 % this year. In addition, the situation has become a global health crisis, with the epidemic spreading rapidly around the world. The impact on the global economy becomes more apparent, as estimates of the global growth for this year are lowered to 2.4 % – from 2.9 %, as originally planned for 2020.

The rest of the paper is organized as follows: In a second section, we present the method of analysis, used in our paper. In a third section, we present the impact of the Corona virus in the world economy. Finally, in a fourth section, we conclude.

2. Materials and Methods

The coronavirus epidemic (COVID-19) has already caused considerable human suffering and major economic disruption. The contraction in production in China has had worldwide effects, reflecting China's growing importance in global supply chains and in commodity markets. In other economies, the spread of the virus has had similar effects, but to a lesser extent so far.

The objective of this study is to examine the effect of Coronavirus-2019 on the global economy. To do so, we employ a strategy of descriptive analysis of the data, collected from the World Health Organization. These data are for a short period between two and three months. So, we cannot adopt an empirical methodology. Therefore, we employ principally the data relative to the Covid-19 and its influence on the world economy, which are published, principally, by the World Health Organization.

Then, we present the impact of Covid-19 on the world economy, on the fall in demand for raw materials, on the tourism, on multinationals industries (chemicals, textiles, aeronautics, the automotive, electronics and electrical industries, hotels and restaurants), on the international stock market and on the banking sector. This effect is based on the analysis of the pourcentage, published by the World Health Organization.

3. Result

3. 1. The impact on the world economy

Stock markets, chemicals, textiles, cars, electronics Beyond China, the coronavirus will weaken the world economy. The coronavirus epidemic that has appeared in China since late December will have a short-term impact of 1 to 2 percentage points of GDP on the Chinese economy, which presented in [3]. The most disrupted sectors are chemicals, textiles, automotive and electronics. Europe is the region that will suffer the most, with the risk of recession in Germany and Italy. The epidemic is growing every day and is becoming a real concern for citizens, governments and businesses around the world. It is still too early to measure the impact that the Chinese coronavirus epidemic will have on the world economy. But it already has penalizing consequences for many international companies because of the importance of China, both as a market and as a producing country. We will present in the following an inventory of the most affected sectors.

3. 2. Fall in demand for raw materials

The main impact of the epidemic in China on the world economy is linked to the fall in demand for raw materials, which is driving prices down. Oil and copper plunged about 10 % in one week. Producing countries, such as Russia (for oil) or Chile (for copper), could be impacted if the fall in prices continued.

3. 3. Decrease in tourism worldwide

The main affected sector, China closed the doors of its cities and prohibits the organized trips of its nationals inside the country and abroad, in an attempt to contain the contamination. Several airlines, including Air France, British Airways, Air Canada, Lufthansa, American, United or Delta, have suspended or will soon suspend their flights to mainland China. Countries, like the United Kingdom, Germany and the United States, advise against any travel there. Some, such as Singapore or Australia, have even banned the entry into their territory of all non-residents, arriving from China, and the United States will do the same. Washington also imposed around 40 of its own nationals who went to Hubei, the cradle of the epidemic. Russia has closed its 4,250 km of the land border with China [1]. Tourist activities are not to be outdone. Disney has closed its amusement parks in Shanghai and Hong Kong.

Several cruise lines, such as MSC Cruises, Costa Cruises and Royal Caribbean, have canceled trips from Chinese ports and refuse to take on passengers who have stayed in China in the past two, if not four weeks. In terms of world tourism, recent years have been characterized by an influx of Chinese tourists. China is the country in the world, where the most tourists come from. The virtual closure of links between China and the rest of the world has had consequences on the countries that depend on this activity, especially in Asia (Thailand, Japan, Europe, etc.). Finally, the airline and luxury goods sector (which is highly dependent on Chinese consumers) could suffer from a slowdown in demand. A lasting slowdown in Chinese industry has blocked factories around the world that are missing essential components. The economic impact of the epidemic has not so far been catastrophic. However, a sustained blockage of the Chinese economy, the second largest in the world, could derail the global growth.

3. 4. Impact on multinationals

Wuhan and the province of Hubei, placed under quarantine, are industrial nerve centers, based on the research, developed by [4–8]. The industries most likely to be immediately affected by the epidemic are chemicals, textiles, aeronautics, the automotive, electronics and electrical industries, hotels and restaurants. From a trade perspective, Europe is the most exposed, with 1.2 % of GDP of goods, exported to China, which could rekindle the risks of a recession in Germany and Italy. This epidemic could cost Europe 0.2 points of growth this year. In terms of disruption of the value chain, the five potentially most affected economies would be Taiwan, South Korea, the Netherlands, Hungary and Indonesia. The countries, most exposed to Chinese demand for finished goods, are Hong Kong, Japan, Germany, South Korea and the United States.

a. The multinationals of Consumption

In a China, where the epidemic is disrupting distribution networks and where vegetable prices are soaring, some multinationals have had to close all or part of their stores, even if most of the population remains cloistered at home and flees anyway businesses. Apple has closed all of its stores in mainland China until further notice. Starbucks, for which China is the world's second largest market, has closed a half of its 4,000 outlets in the country. Hundreds of McDonald's restaurants have also closed in Hubei Province, of which Wuhan, the epicenter of the epidemic, is the capital. Pizza Hut and KFC have also experienced store closings, imposed by their respective Chinese joint ventures. Finally, after the cancellation of several international sports competitions, including the Alpine Skiing World Cup events, China announced on Thursday the postponement of its 2020 football season.

b. Automotive industry

Wuhan is an industrial city, where many international automotive groups have settled. Present since the 1990s, the French PSA manages three factories there and employs 2,000 employees, including 38 expatriates. The latter were repatriated to France. The three factories of the group, which should have reopened on February 3, will remain closed until February 14, PSA is complying with the instructions of the authorities. They closed on January 24 for the Chinese New Year holidays. The Japanese Nissan repatriated its personnel from Wuhan. The Italian American Fiat Chrysler, the American General Motors and Ford have implemented restrictions for their teams. Tesla electric car pioneer has warned that coronavirus could disrupt the ramp-up of its giant new factory in Shanghai.

c. Electronic sector

Taiwanese giant Foxconn, the world's leading supplier of electronic components and with several production units in Wuhan, will not reopen its Chinese factories until March. To take into account the uncertainties, Apple, a large customer of Foxconn, has however given a forecast of turnover for its second quarter wider than usual, even if their managers have assured to have alternative suppliers.

3. 5. Impact on the financial sector

3. 5. 1. Impact on the world stock market

Global stock markets experienced their worst week since the 2008 global financial crisis, as concerns about the impact of the coronavirus continued to worry investors. The top three US indices ended the week down 10 % or more. The Dow Jones fell 1.4 % on Friday, recovering from its previous lows, while the S&P fell 0.8 % and the Nasdaq remained roughly flat (Fig. 2). All stakeholders are aware that the coronavirus presents progressive risks for economic activity. Earlier, the main European markets

fell sharply, with the London FTSE 100 index down 3.2 % for the day. The German Dax index fell 4.2 %, while the French Cac 40 index fell 3.9 %. In Asia, the Japanese Nikkei 225 index fell 3.7 %, bringing its week's drop to more than 9 %. The Shanghai Chinese composite index also fell 3.7 %. Investors are concerned that the coronavirus will trigger a global recession.

The announcement of new cases of death from the coronavirus, especially in Italy, raised fears of a much greater economic effect than expected. It could lead to the deterioration in the growth prospects of the Western world. The impact has mainly affected hundreds of businesses that have experienced supply chain disruptions and declining consumer demand. Multinationals have declared that their activities will be affected, and several banks, such as investment firm Goldman Sachs, have warned that the coronavirus is likely to reverse any growth in corporate profits this year. In addition, actions in the airlines have been particularly affected by the travel ban and the companies that restrict staff travel. Their incomes had been affected by lower demand, following the epidemic.

As large outbreaks arise outside of China, it is not only global supply chains that are being affected, but also consumer demand that has declined dramatically. What is unknown is exactly the severity and duration of the impact. But what we do know is that this is coming at an already difficult time for the global economy with Japan, Italy, China and the United Kingdom among those who are already seeing growth falter [1]. As economists lower their growth forecasts, policymakers discuss what they can do to help, given low interest rates. What is quite clear is that investors are facing more anxiety. However, the spread of the coronavirus infection outside of China, with the emergence of clusters in South Korea, Italy and Japan, has greatly increased concerns. Traders have fled to less risky investments, such as public debt, sending bond yields to new lows. Meanwhile, oil prices also fell, fearing that the virus would hurt demand, with Brent prices falling more than 3 % to around \$ 50 a barrel, the lowest level in over a year.

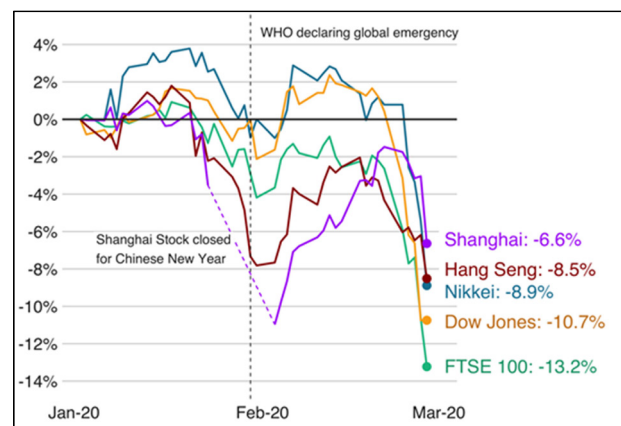


Fig. 2. Coronavirus impact on the international stock market
Source: Bloomberg

3. 5. 2. Impact on the banking sector

Concern over the coronavirus is mounting in the global banking sector. The appearance of the new coronavirus will involve unpredictable human and economic consequences, and several European banks generate more than 50 % of their revenues in Asia and estimate growth between 5 to 7 % for 2020. The Basel Committee called on the sector to be vigilant about the risks to global financial stability. HSBC and Standard have also sounded the alarm bells, and have declared that the impact will

be enormous on their accounts, which is why they announced the injection of more than \$ 600 million in additional provisions for if the health crisis should persist in the second half, to this must be added that they will revise their objectives, following the persistence of this epidemic.

Italian banks were targeted. UniCredit and Intesa Sanpaolo saw their CDS (cost of hedging against their credit risk) increase by several points, compared to their highest in January. Central banks were stuck with low rate policies, even zero rates or even negative. The Federal Reserve, after having raised its rates several times, in the spirit of returning to a certain normalcy, it lowered them again. It has also relaunched a quantitative easing program, by massively injecting liquidity into the interbank market. In the funding and analysis teams, this is a new risk factor that must be taken into account, when studying new funding files. Debt issues thus require more discernment, depending on the sectors, exposed to the risk of a pandemic, such as tourism, transport and maritime, as well as those, affected by their supply chain to China.

The Basel Committee has however split a press release to alert risks to financial stability: The committee encourages banks and their supervisors to remain vigilant in the light of the development of the situation and stresses the importance of sharing information and cooperate during such shocks. The global banking regulator will focus on examining the precise risks for banks, created by leveraged loans and collateralized bonds. Since the beginning of January, the European and Asian financing markets have been in decline. In Europe, debt issues fell 27 % (to \$ 77.3 billion) and even 63 % in number, to the lowest level since 2008 (79 transactions only). In Asia, it's a stampede: issue volumes have decreased by 74 %, to only \$ 26.8 billion since January, their lowest historic level since 2008. The number of transactions has decreased by more than half.

It is in China, that the biggest concern for the banking system lies, with the largest establishments in the world, weakened by stocks of bad debts. According to S&P, credit defaults are expected to triple. The Chinese government has extended a further 500 billion yuan (\$ 71 billion) in credit guarantees, in addition to the \$ 300 billion, announced to support SMEs. Banks are encouraged to postpone their repayment requirements in the event of cash flow difficulties. According to [9] and for the whole world, COVID-19 could lead to a series of economic and financial disasters that the central banks will have amplified by their reckless decisions. According to the Bank for International Settlements, at the end of Q3/2019 the total debt outstanding in the three main currencies, dollar, euro and yen, held by non-financial companies, was respectively:

- In dollars, \$ 87 160 billion, of which 34 000 by the States and 53 160 by non-financial borrowers.
- In euros, 45 650 billion, including 15 550 by the States and 30 100 non-financial borrowers.
- In yen, 3,409,000 billion, held by the Japanese state for 1,270,000 and by domestic borrowers for 2,100,000. Converted to US dollars, the total outstanding credit on these three currencies in 2019 was 169.160 billion, almost twice the wealth, created on Earth.

The latest OECD study warns against the excessive accumulation of debt, held by non-financial borrowers, namely individuals and businesses. In 2019, more than 51 % of the debts, issued by companies, received the BBB credit rating, the worst rating before the junk bonds which represent 20 % of the issues. At the same time, this distribution of free money has exploded the value of all financial assets and real estate. The perversity of the low interest rate mechanism has enabled

companies, but also states to increase their debt ratios while maintaining their ratings.

Corporate takeovers of their own shares are reaching new heights. But in doing so, they mechanically reduce their equity and become more fragile. A loss of activity or an increase in rates would have a disastrous effect. Against a clash of offers they can do nothing. They can print paper, but that will not restart the production lines and will not remove the confinement of the workforce. The only thing they could do is to make the commercial bank lending program a little easier, so that the commercial banks would support cash-strapped businesses.

But this is where the second effect of the perversity of low rates comes in. If the shock persists and the shortage takes hold, the famous inflation that they are looking for so much and which has justified all the negative rates, could well force them to raise the rates much faster than expected. At that time, however abundant liquidity that will be required by cash-strapped companies will most likely have denied them. Because these same companies, fragile in terms of equity and cash, are the same ones that are engorged with badly rated debts that will see rates soar and their ratings lower. European and American equity indices seem to have integrated this inability of central banks to act in the face of the current situation.

They all fell 10 % in three days and still haven't rebounded. The change in the psychology of the participants seems clear. The implied volatility of the markets which remained unmoved during the last downturns, increased by 145 %, going from 11 % to 27 % on the CAC40 and also on the American VIX. Let us bet that this unfortunate episode of the current pandemic does not turn into a nightmarish series for the populations, affected to which would be added a monstrous economic and financial mismanagement, created by institutions and States which never want to take the measures that all know necessary, but for which they lack the courage.

3. 5. 3. Impact on Gold

According to the IMF, concern is growing, and the coronavirus epidemic has jeopardized the recovery of the global economy. Gold has benefited from the terrible epidemic of coronavirus that has struck many countries around the world. The precious metal increases in price as panic spreads across the world. The coronavirus crisis allows gold to show its quality as a safe haven. As the Covid-19 virus, which has killed more than 2,700 people around the world, begins to seriously affect Europe, with Italy in the lead, the price of the precious metal takes advantage of this to rise. On February 24, it hit a seven-year high of \$ 1,689.31 an ounce.

If the following day, it relapsed, the fault of massive sales of paper gold contracts on the futures markets, according to several observers, it was still moving around 1,645 dollars at the end of February, an amount, much higher than before the coronavirus crisis. At the end of February, following a record in seven years, the price of gold fell quite sharply. Several observers point to the massive sale of futures contracts to explain this fall. This kind of event is well known to those who follow the gold market closely. The US Central Bank does not want gold to peak. The rise in gold is a manifestation of distrust of the dollar. The FED wants the greenback to be the haven, not the gold.

When the price of gold goes up steadily for several days in a row, in general, there is a short sale of a significant amount, carried out by a US commercial bank on behalf of the FED. Such an approach causes a fall in the price, which has no economic rationality. The point of all of this is simply to break the bullish momentum in gold prices. Such a strategy makes sense, when

the reasons why the price of gold goes up are not very important. But the current environment, especially with helpless central banks and a worried coronavirus crisis, makes the reasons that push gold prices up are solid. In the same period, the price of gold increased. The yellow metal is a finer and more accurate measure of the stress on the global economy.

4. Discussion

This epidemic of coronavirus which appeared in China in December 2019, has spread around the world, and has caused the death of thousands of victims, and the global organization of the health declared this coronavirus as a pandemic in January 2020. Certainly this health crisis is not the first in China, in fact, there had been a previous viral epidemic of great magnitude than that of SARS (severe acute respiratory syndrome), which had killed 774 people in 2003, but this new virus, which appeared in December 2019, had so far cost China two points of GDP in the second quarter. Currently, it is impossible to know what its size will be, but it suffices to look at the latest figures for Italy or South Korea to see that the epidemic is far from being under control.

China accounts for about a quarter of global industrial production and manufactures many components for the rest of the world. The repercussions of this crisis are clearly present, in particular at the level of stock market falls across the planet, and the paralysis of Chinese production chains, which has affected several sectors around the world, such as industry, tourism, transport, air, a panic in several countries like Italy, Iran... the reasons for worrying are not exaggerated. The world cost of this pandemic had been approximately 50 billion dollars, hardly 0.10 point of GDP. The impact of the current pandemic is very significant, given that the Chinese economy is today more dependent on consumption (50 % of GDP growth in 2019 compared to 28 % in 2003) and that the country is twice more integrated into the global value chain (15 % of world GDP in 2019, compared to 8.7 % in 2003). The coronavirus had so far cost more than

0.2 points of the global growth. However, the reaction of the Chinese authorities is this time more massive. Indeed, they imposed draconian containment measures, in order to limit the spread. On the financial side, in order to reassure investors, the Chinese People's Bank injected 1,200 billion yuan (156 billion euros) of liquidity into the financial system in early February.

These financial and monetary policies can mitigate the economic impact of the epidemic, in particular by avoiding the bankruptcy of many companies. Great concerns about China have arisen, the country and the factory of the world. A shutdown by China will paralyze international supply chains and this could certainly lead to a global crisis, and moreover this is what really happened, the sectors most exposed to the risk of this pandemic are: tourism, maritime and air transport, the world's major stock exchanges, the financial and banking sectors, containment decisions have blocked work and consumption.

A financial crisis will surely appear, and the Basel Committee has published a statement to alert the risks to financial stability: The committee encourages banks and their supervisors to remain vigilant in the light of the development of the situation and underlines the importance of sharing information and cooperating when new risks arise. And moreover, this new health risk never appeared in regulatory tools or banking supervision. So, we must rethink a new supply chain model. The current coronavirus epidemic in China has had a real impact on the world economy, and this has shown once again that there are international imbalances. Following this, we must rethink to have a new model, which will once again link, but in a different way, economic, industrial, financial and government players to rethink a new model for value creation and their supply chains, supply. We will have to think seriously about a new relocation process, encourage local industrialization, and end the old waves of relocation. Above all, reduce this obsession with cost reduction in order to explode dividends, and all this despite local industrialization must be encouraged in order to absorb unemployment and avoid crises and its domino effects.

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